

# ECTA-CEFIC GUIDELINES FOR EQUIPMENT FOR THE TRANSPORT OF DRY BULK CARGO, TO BE DISCHARGED BY TIPPING

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## DISCLAIMER

This document is intended for information only and sets out guidelines for equipment for transport of dry bulk cargo, to be discharged by tipping. The information contained in these guidelines is provided in good faith and, while it is accurate as far as the authors are aware, no representations or warranties are made with regard to its completeness. It is not intended to be a comprehensive guide to all the transport equipment used for dry bulk cargo. No responsibility will be assumed by the participating associations, Cefic and ECTA, in relation to the information contained in these Guidelines.



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## INTRODUCTION

The effort to continually improve safety during transport and the associated handling of chemicals is part of the overall objective of both the chemical industry and the transport industry to operate in accordance with the Guiding Principles of Responsible Care.

These Guidelines have been developed with the aim of offering guidance regarding specifications for transport equipment specifically designed for the transport of dry bulk cargo, which is to be discharged by tipping.

Companies may decide to apply the guidelines either in full or in part, taking into account specific circumstances and own requirements.

Compliance with any applicable national and international regulations always takes precedence over adhering to the recommendations made in the present Guidelines.

## OBJECTIVE AND SCOPE

The objective of these Guidelines is to describe the equipment designed for the transport of dry bulk chemical cargo, which is discharged by tipping, such as silo trailers and dry bulk containers.

The following types of equipment are included in the scope of these Guidelines:

### SILO TANKERS

Tipping silo road tanker: a road trailer carrying dry bulk cargo in a single compartment vessel. The trailer is designed for top loading and for discharge by air pressure and tipping of the vessel.

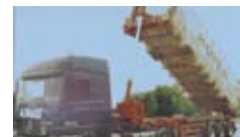


### CONTAINERS

- **Pressurised cylindrical silo container:** a single-compartment vessel built into a container frame and designed for top loading and for discharge by air pressure and tipping.



- **Pressurised dry bulk box container:** a single-compartment tank container designed for top loading and for discharge by air pressure and tipping.





- **Unpressurised dry bulk box container:** a freight container specifically adapted to carry dry bulk cargo e.g. alu-box containers and bag-in-box containers. Bag-in-box dry bulk containers contain a liner (i.e. a bag with the size of the container), equipped with fill and discharge spouts. Whereas loading is done over the top, discharge is usually done by gravity by tipping the container and using rotary valves.



- **Container:** a container attached to a chassis / trailer with the use of twist locks. The tipping chassis is designed to raise the container to an angle of 35-40 degrees.



These Guidelines do neither cover dry bulk transport equipment discharged without tipping nor ISO containers, with liner bags, on a tipping chassis.

Also tractor units and dedicated product specific equipment are outside of the scope of these Guidelines.

#### OTHER GUIDANCE

Additional guidance on the responsibilities and roles of persons involved in loading and unloading operations can be found in the Cefic-ECTA Behaviour Based Safety Guidelines for the Safe Loading and Unloading of Road Freight Vehicles (Issue 2, March 2007).

Separate Best Practice Guidelines for Transport Equipment for Chemical Packed Cargo have already been published in March 2007.



# 1 EQUIPMENT SPECIFICATIONS FOR TIPPING SILO ROAD TANKERS AND PRESSURISED SILO / BOX CONTAINERS

## 1.1 GENERAL SPECIFICATIONS FOR TANK AND ACCESSORIES

The equipment should comply with the following specifications:

- is made of aluminium or stainless steel
- is fit for a working pressure of minimum 0.5 bar
- bearing an indication of the maximum allowed overpressure on the exterior of the tank
- bearing an indication of the content (in m<sup>3</sup>) on the exterior of the tank
- the inner walls of the tank, including all welds and connection pieces, have a smooth surface
- has one compartment
- the tank has at least one entrance with a diameter of minimum 450 mm
- if dislodged, any appendages affixed to the equipment cannot mix with the product
- has properly identified earthing points and / or earthing wire
- all openings are designed and constructed to allow sealing

It is further recommended that:

- for the unloading of powders (except in the case of explosion-sensitive powders) a fluidization system is installed
- if applicable, the rear landing legs are specifically designed for tipping equipment and the inner mechanism of the rear landing legs is protected against corrosion
- the earthing wire has a minimum length of 8 m and a minimum diameter of 10 mm<sup>2</sup>, has a maximum resistance of 3,5 Ohm, is wound on a reel and is fitted with crocodile clamps.

## 1.2 TOP MANHOLES

Manholes should comply with the following specifications :

- are located above the center line
- rims are free of damages and dents
- have swing bolts or equivalent fasteners
- manhole covers pivots or opens to 180 degrees
- gaskets are made of synthetic rubber or of material that is compatible with the product

## 1.3 HANDRAIL / WALKWAY

Handrail and walkway are not sufficient to guarantee a safe access to the top manholes. Therefore at loading and unloading sites all necessary measures, in addition to a handrail and walkway, should be taken in order to ensure that personnel can safely work on top of the tank. Attaching the protection gear of a fall arrest system to the handrail is not considered to be a safe practice.



If the top of the tank is not flat, the tank must be fitted with an access ladder and a safety handrail along the walkway.

Walkways need to have an anti-slip surface or structure.

When equipped with a handrail and walkway, the following minimum specifications should be complied with:

- the minimum width of the walkway is 400 mm
- the minimum height of the handrail is 1000 mm along the entire walkway
- additional protection exists at half of the height of the handrail (e.g. a steel cable)
- the handrail is capable to withstand a horizontal tension of 300 N in all directions
- the handrail is erected before stepping on the walkway.

**Note:** As the majority of pressurised box containers is not fitted with a handrail, it is necessary that loading and unloading sites take all necessary measures (e.g. safety harness, safety platform) in order to ensure that personnel can safely access and work on top of the container.

## 1.4 BLOWER / COMPRESSOR

The safest and the best solution for guaranteeing product integrity is the use of a product-dedicated blower / compressor, supplied by the loading or unloading site.

If a blower / compressor is however provided with the vehicle, it should comply with the following specifications:

- does not contain oil
- all moving parts are properly protected by a safety cover
- is fitted with a filter, filtering the incoming air (to be inspected at least once a year) of which the air inlet is placed away from the exhaust of the vehicle engine

**Note:** Attention is to be paid to the noise level resulting from the whole unloading process and possible improvements should be discussed with the unloading sites.

## 1.5 DISCHARGE FILTER EQUIPMENT

The following specifications should be complied with:

### 1.5.1 DISCHARGE AIR FILTER

- is made of stainless steel or aluminium
- is installed in the air supply line after the compressor but before the manifold
- is sealable

#### FILTER ELEMENT

- is made of sintered stainless steel
- is shock-proof and retains particles larger than 5 microns
- can be easily removed for cleaning and inspection purposes



### 1.5.2 MANOMETER

- A manometer is installed between the discharge air filter and the manifold and also the tank is equipped with a manometer.

**Note:** Some products may require specific unloading conditions related to temperature and pressure. Compressors with intercoolers or the use of a tank by-pass may be considered as best practice alternatives.

- The manometer is adapted to the flow rate of the compressor.

## 1.6 THERMOMETER

A thermometer is installed close to the manifold.

## 1.7 AIR CONDUCTS

Air conducts after the discharge air filter, whether flexible or fixed to the equipment, should meet the following specifications:

- are made of aluminium, stainless steel or synthetic rubber
- are constructed in such a way as to allow visual inspection at all points
- at least one safety relief valve is installed between the filter and the tank with an adequate capacity, and with pressure settings in line with the design of the tank
- at least one non-return valve is installed after the discharge air filter in order to prevent product particles entering the filter when the blower is turned off

## 1.8 DISCHARGE MANHOLE AND VALVE

The following specifications should be complied with:

### 1.8.1 DISCHARGE MANHOLE

- is located in the center line of the tank
- has a diameter of at least 450 mm
- rims are free of damages and dents
- is closed with at least four swing bolts
- is properly secured when opened
- gaskets are made of synthetic rubber or of material that is compatible with the product

### 1.8.2 DISCHARGE VALVE

- is a butterfly valve made of stainless steel or aluminium
- allows for easy inspection
- valve gaskets, if present, are made of synthetic rubber or of a material that is compatible with the product

## 1.9 HOSES AND COUPLINGS

### 1.9.1 HOSES

The safest and the best solution for guaranteeing product integrity is the use of product-dedicated hoses and couplings, supplied at the unloading location.





However, all hoses provided with the vehicle, should comply with the following specifications:

- meeting at least the test pressure of the tank
- made of a material that is compatible with the product
- equipped with dust caps on the coupling or stored in closed compartments
- made to prevent transfer of electrostatic charges
- having a length (assembled) of approximately 10 m and allowing for easy visual inspection
- having a diameter of at least 80 mm

### 1.9.2 COUPLINGS

Couplings should comply with the following specifications:

- all gaskets that come into contact with the product are made of neoprene rubber, PTFE, silicon rubber or a material that is compatible with the product
- gaskets do not protrude into productlines or air supply lines
- couplings exactly fit to the size of the discharge hose
- the connection between coupling and hose is made in such a way so that no granules can remain in the connection
- have a securing system, which prevents the unintended opening through vibration or shock (e.g. clamp, safety lock)
- are easy to handle and clean

## 2 EQUIPMENT SPECIFICATIONS FOR UNPRESSURISED DRY BULK BOX CONTAINERS

### 2.1 GENERAL SPECIFICATIONS FOR THE BODY OF THE CONTAINER AND ACCESSORIES

The equipment should comply with the following specifications :

- bearing an indication of the content (m<sup>3</sup>) on the exterior of the tank
- the inner walls have a smooth surface
- has one compartment
- has at least one 450 mm opening
- if use is made of an inner liner there are fixing points on the top as well as on the bottom of the inside of the container. The use of a "safety" liner, which is designed for bottom sampling and equipped with incorporated document pouch, is recommended as it reduces the need to access the top of the container and the need for untying the liner.
- if dislodged, any appendages affixed to the equipment cannot mix with the product
- all openings are designed and constructed to allow sealing

### 2.2 GASKETS AND VALVES

All gaskets that come into contact with the product are made of synthetic rubber or of a material that is compatible with the product

### 2.3 TOP MANHOLES

Top manholes should comply with the following specifications:

- are located above the center line of the tank
- rims are free of damages and dents
- have swing bolts or equivalent fasteners
- manhole covers open to 180 degrees
- gaskets are made of synthetic rubber or of material that is compatible with the product



## 2.4 HANDRAIL / WALKWAYS

Loading and unloading sites should take all necessary measures to ensure that personnel can safely work on top of the container. Handrail and walkway are not sufficient to guarantee a safe access to the top manholes. The majority of this equipment is not fitted with a handrail. Walkways should have an anti-slip surface or structure.

## 2.5 HOSES / BLOWER / COMPRESSOR / DISCHARGE AIR FILTER / AIR SUPPLY LINES / COUPLINGS

Requirements as described in Chapter 1 are applicable.

# 3 | TIPPING CHASSIS

## 3.1 TWIST LOCKS and LANDING LEGS

Rear landing legs on the tipping chassis are specifically designed for tipping operations and the inner mechanism is protected against corrosion

Further information can be found in the ECTA brochure "Recommendation for tipping equipment" (see [www.ecta.be](http://www.ecta.be)).

## 3.2 ROTARY FEEDER



If present, the rotary feeder should comply with the following specifications:

- inner parts do not have sharp corners
- is made of material that is compatible with the product
- is easy to clean and to inspect

The feeder rotor shall have bearing outboard and have air- and dust-tight seals. The connection between the container or the liner and the rotary feeder is designed to prevent product contamination and to avoid obstructing the steady flow of the product. The air vent of the rotary feeder is equipped with a venting bag to retain dust.

## 3.3 EARTHING WIRE ON THE CHASSIS

The earthing wire should comply with the following specifications:

- have a minimum length of 8 m
- have a minimum diameter of 10 mm<sup>2</sup>
- have a maximum resistance of 3,5 Ohm
- be wound on a reel
- be fitted with crocodile clamps.

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